Creation / Evolution

CHARLES DARWIN

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SYMPOSIUM ON CREATION AND EVOLUTION

The Science Council of New York City will hold an all-day symposium on Creation and Evolution on Saturday, December 6, 1980 in the auditorium of Rockefeller University (9:30 a.m.-4:00 p.m.). Speakers will include Isaac Asimov, Niles Eldrege, Wayne Moyer, and Stanley Weinberg. Includes an open forum to suggest ways of forming a New York State Committee on Correspondence.

Send $2 registration fee promptly to: SCONYC, c/o Rose Blaustein, Box 7, Franklin Lakes, NJ, 07417. Limit: 400 persons.

Dear Reader,

The events in Iowa between 1977 and 1980 regarding the creation/evolution controversy (described in Stan Weinberg's article) easily represent a model that can be applied to the whole nation. Creationists did there what they do everywhere, only more of it. And the methods used to defeat the creation bills are the same successful procedures that have worked in other localities.

That this battle was significant was attested to in the "Science and the Citizen" column of the July, 1979 issue of *Scientific American*. It said in part: "This past winter and spring bills to require equal time for creationist views were introduced in several state legislatures. . . . The major effort was made in Iowa. . . ." And when these bills were defeated, the impact was felt across the country. This is why the Iowa experience can be so useful, and so applicable, to concerned evolutionists in other states. The lessons learned there can be expanded upon and developed for the benefit of scientific freedom in general, and the teaching of evolution in particular.

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REACTIONS TO CREATIONISM IN IOWA

by Stanley L. Weinberg

Special creationists have been very active here in Iowa in the past few years. Bills calling for equal time in the public schools for creation and evolution were introduced in the Iowa legislature in 1977, 1979, and 1980 (none of which passed). And during this time there's been intense discussion throughout the state on the creation-evolution issue. The controversy here represents a major creationist effort, and has produced a major reaction by evolutionists.[1,2] These events in Iowa also seem to have had a substantial impact throughout the United States. One lesson learned is that evolutionists acting on the state and local level can successfully counter the grassroots campaigning of special creationists. Local involvement by evolutionists would be even more effective if there were more communication between individuals and groups around the country.

The Iowa Creation Bills

It is hard to determine why the creationists chose Iowa—a stable, prosperous, heartland state—as a key target. Politics here are temperate and demagoguery doesn't go down well with Iowans. Perhaps one feature that made Iowa attractive to the creationists is the unique nature of the campus at Iowa State University (ISU) which is academically a first-rate university with outstanding schools of agriculture, home economics, and veterinary medicine. And on campus David Boylan, Dean of Engineering, is a leading creationist. Also there is a 400-member Bible Study Association composed of active and ardent creationist students.

But whatever the cause, in February 1977 a creationist bill was introduced in the lower house of the legislature. It read:

> If a public school district offers courses which teach pupils about the origin of humankind and which include scientific theories relating to the origin, instruction shall include consideration of the creation theory as supported by modern science.[3]

Dr. Weinberg is a college teacher of 30 years experience, has authored high school biology and physical science texts, has served as Vice President and Director of the National Association of Biology Teachers, and has been concerned with the creation/evolution controversy for many years.

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The bill attracted very little attention or support and it died in committee. Whereupon the creationists undertook a two-year publicity and lobbying campaign in preparation for their next effort.

There were floods of letters-to-the-editor in the newspapers and call-ins to radio talk shows. Meetings were held throughout the state. Duane Gish came to Iowa several times to speak. Legislators and legislative candidates were lobbied and were asked to pledge support for a new creationist bill.

There were some responses from evolutionists to these activities, though in lesser volume. The Des Moines *Register*, which covers the state, reported it was receiving many more letters supporting creationism than evolution. But the paper printed approximately equal numbers of comments on both sides. The letters pretty well covered all aspects of the controversy. Editorially the *Register* supported evolution and opposed equal time.[4] Several legislators complained they were swamped with appeals from creationists but were hearing almost nothing from evolutionists. The pro-evolutionists in some degree responded to this by stepping up their lobbying efforts. Pro-evolutionists also organized or participated in various meetings, conferences, and debates. As an example, the writer spoke at the three state universities.

Public bodies began to react to the dispute. In May 1977 a local school district asked the Iowa Department of Public Instruction (DPI) to consult with scientists to determine if the evidence for creationism was credible and if it should be taught in schools to examplify good scientific investigation. A legislator asked DPI to study the status of creationism in the public schools of other states. Responding to these inquiries, DPI commissioned a study by its science consultant, Jack A. Gerlovich. Questionnaires were sent to all state departments of education. Forty-five states responded. It was found that few states have guidelines for dealing with the controversy. The methods used generally involve either neutrality, or selection or screening of teaching materials by a state committee. Six states, either by legislation or by departmental regulation, require some form of recognition of creationism.

DPI also sent inquiries to two dozen scientific, educational, civic, and creationist societies; to church organizations; and to most Iowa colleges. Interviews or correspondence were conducted with several hundred scientists and other concerned individuals. Relevant legal literature was researched. Finally a position paper was prepared which supported evolution as a valid scientific theory.[5] (It has been reprinted in several journals and about a thousand persons in various states and foreign countries have asked for copies.) The paper did not mandate the teaching either of evolution or of creationism, however. The decision to teach both concepts, either, or neither was left in the hands of local boards. Some respondents were not happy with this last, open-option position. It was necessitated, however, by a basic Iowa educational policy, unrelated to the creation-evolution issue, that calls for local autonomy in curricular matters.

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DPI writes no curricula in any field. Nevertheless, creationists were dissatisfied with the DPI position paper.

In February, 1979, a second creationist bill, essentially similar to the earlier one, was introduced in the state Senate. The bill evoked renewed concern and response. Governor Robert D. Ray, who is popular in the state, came out against it. The Board of Directors of the Iowa Academy of Science adopted the following resolution:

> As scientists we object to Senate Bill #458 which proposes to equate "scientific creationism" and evolution as scientific theories. We object primarily because "creationism" is not science but religious metaphor clothed as scientific fact. There is an overwhelming acceptance by knowledgeable scientists of all disciplines that evolution is consistent with the weight of demonstrable evidence. We feel that Iowa students deserve an education consistent with views of legitimate scientists and the "creationist" views have no proper place in the science classroom. We fully respect the religious views of all persons but we object to attempts to require any religious teachings as science.[8]

The academy statement was distributed to members of the Senate on the day of a public hearing on the bill before the Senate Education Committee. At the hearing in the main Senate chamber, attendance by both Senators and the public was good. There was extensive coverage by the press and the electronic media. Creationist students from ISU held demonstrations in the balcony and outside the chamber, but the demonstrations and the hearing itself were orderly. Speakers supporting evolution included professors of science and other disciplines from all Iowa universities; high school teachers; clergymen; organizational representatives; and this writer. Creationist speakers included Dean Boylan and a bacteriology professor from ISU; a Des Moines high school teacher; several students; and creationist Richard Bliss, imported from San Diego.[9]

Following the hearing, the equal-time bill was referred to the Finance Committee because it entailed an expenditure. The committee in turn deferred the bill to the 1980 legislative session. Several factors probably contributed to the bill's failure to progress. These factors were the required expense, the substantial discussions in the newspapers and elsewhere. The *Register*'s editorial position, Governor Ray's stand, DPI's principled but even-handed position paper, the intercession of the Academy of Science, and the steadfastness of a group of senators committed against the bill. Especially important was the involvement of a large number of evolutionary scientists, both in generating pro-evolution publicity and in speaking at the Senate hearing and other meetings.

With the bill in limbo, activity continued on both sides. During the summer

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of 1979, an Interim Study Committee of the legislature was directed to review the controversy and make recommendations to the full legislature. Luther Sunderland, an engineer with General Electric in New York, testified on behalf of the creationists. Sunderland also testified before a committee of the New York State Education Department. Before both groups Sunderland quoted two leading paleontologists, Colin Patterson of the British Museum and Niles Eldredge of the American Museum of Natural History, in support of creationism. Later, both scientists indignantly charged that Sunderland had misinterpreted interviews that they had given him.[10]

The interim Committee decided not to recommend a new creationist bill to the legislature. Instead, the 1979 bill was revived in a new version:

> Whenever the origin of mankind or the origin of the earth is alluded to or taught in the educational program of the public school corporations of this state, the concept of creation as supported by scientific evidence may be included.[11]

There were two significant changes in this third creationist initiative: (1) The bill would have applied to *all* public educational institutions, not just to the lower schools. (2) The bill was permissive, not mandatory. Thus it would have been without force, since Iowa law and educational policy already permitted school districts to teach creationism if they wished. I discuss below the probable reason why creationists wanted this meaningless law on the books. In the 1980 legislative session this permissive bill was defeated in a close but decisive vote. Yet nobody in Iowa will be surprised to see a creationist bill appear in a new incarnation in the 1981 session.

The National Impact

What has been the national impact of this three-year development in a placid cornbelt state? First, events in Iowa have been widely publicized in newspapers and magazines across the country.[12] Second, the Iowa controversy has served as the epitome of similar creation-evolution disputes during the past two years in fifteen other states. In none of these states have the creationists succeeded in getting a bill through the legislature.

Educational authorities in half a dozen of these states have sought advice from the Iowa DPI in dealing with their own creationist problems. Individuals in these states have similarly been in touch with individuals in Iowa. In each case Iowa's strategic and tactical example was followed. Even in those states that have had no contact with Iowa, the pattern of response has been the same—reliance on *ad hoc* groups led by local scientists, with no involvement by national organizations.

Looking at the events in Iowa and elsewhere in the nation, one can reason-

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ably make two predictions: (1) Legislative initiatives by the creationists can be expected in various states. (2) Organized responses to these initiatives, by local scientists and their allies, have an excellent chance of success.

Yet despite the intense legislative action, favorable laws are not that significant in determining the success of the creationist movement. Nor are court decisions, or the creationist bigwigs who fan out from San Diego on country-wide speaking tours (though these experienced and well-briefed speakers do recruit many supporters and supply them with propaganda materials). What really counts are the zealous groups of local lobbyists. They use simple techniques familiar to all lobbyists. They circulate literature, write letters, buttonhole key people, and go to meetings and make their voices heard.

And they are effective at the grassroots level, where it matters. For example, in one of Iowa's fifteen Educational Areas, none of the twenty-six school districts here teaches evolution with any thoroughness. And in another state, Georgia, few school systems teach anything at all about evolution. One Georgia superintendent said that in his county they spend "part of one period of one day" on it.[13] These situations are replicated across the country. Teachers who wish to teach evolution are often deterred, either by overt or veiled threats of job loss, or by quiet community pressure—"you really don't want to come on too strong on this questionable topic of evolution." In sum, perhaps half the high schools in the country teach evolution in some respectable measure; the other half touch the subject barely or not at all. To be sure, a far smaller number of schools formally teach creationism.

Perhaps it was the strength of creationism in many local Iowa school districts that prompted the creationists to accept a bill that had no legal effect. The bill could still be useful propaganda. But the Iowa Academy of Science is now also moving into the school districts. The Academy is setting up a panel of scientists who will be available to advise schools in dealing with creation-evolution and other controversial subjects in science.[14]

What Evolutionists Can Do

The success of creationism is due partly to the creationists' own admirably efficient efforts, and partly to the fact that more often than not they meet no effective opposition. For whatever reason—inertia, political naivete, reluctance to get involved, or underestimation of creationism's potential—evolutionary scientists have in the past remained overwhelmingly passive in the face of creationist initiatives. Whenever creationists appear before a legislative committee, a local school board, or a curriculum or textbook adoption committee, if two or three evolutionary scientists also appeared, the creationists would not carry the day as they now so often do.

The events of the last two or three years, in Iowa and elsewhere, suggest

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that the scientific community is changing; scientists are becoming more willing to be involved. How are their activities to be focused? In 1978 I suggested a two-component strategy for the defense of evolution; one component was *education*, the other was *political activity*.[15]

Respecting the education component: In times when the creation-evolution controversy has been acute, various prestigious scientific bodies—AAAS, the National Academy of Science, and others—have issued pro-evolution statements. These are largely a waste; and the more prestigious are the names attached to a statement, the less effective it is likely to be. Local communities react negatively to being told by distinguished but remote figures how they should think and act. Local individuals—scientists and other public figures—are far more likely to be listened to. Spokesmen for the Iowa Academy of Sciences are welcome in Iowa schools. I wonder if a Nobel laureate from Washington, speaking on an Iowa problem, would be equally welcome. This does not mean that Iowans are especially provincial; they simply reflect a universal trait.

Being "listened to" implies a program of public education. There is widespread ignorance about what the theory of evolution actually says, and about the evidence that supports it. Local scientists can remedy this situation through a persistent, low-key program of writing letters and articles in the papers, appearing on talk shows, addressing local groups, submitting to interviews, and the like. I emphasize the term *persistent*; education doesn't take place in a day.

The 1978 article helped persuade the National Association of Biology Teachers (NABT) to set up a Committee on Evolution Education under the chairmanship of William V. Mayer. The Committee primarily plans a program of publication, which I am confident will be carried out in excellent fashion.[16] It is both unfortunate and inevitable that Mayer's Committee does not plan to address the fundamental question: Who will use its materials, and how will they be used? But any political involvement would jeopardize NABT's tax-exempt status.

Respecting the political activity component: Individuals and *ad hoc* groups, who are not tax-exempt, would not be under the same constraints as NABT. They will have to be meticulous, however, to conform to state laws covering lobbying, political action, and fund-raising. Evolutionists can carry out the same activities that creationists are. These activities can best be pursued on a local or, at the most, a state-wide basis; not as part of a uniform national campaign. It is a truism, known to and used by every working politician, that American politics is essentially precinct politics. A national or state-wide campaign is basically a summation of a lot of precinct campaigns. As one of many examples, Jimmy Carter started on his road to the presidency by touring Iowa for a year and a half, recruiting workers and supporters in every precinct in the state. The creationists are well aware of this working principle and use it to good effect. Why don't pro-evolutionists use it to the same extent?

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In several states, state-wide pro-evolution groups have already formed. Wayne A. Moyer, Executive Director of NABT, suggested an evocative name for these groups—"Committees of Correspondence."[17] I suggest a term for the leader of each such group—"Liaison"—to indicate the informal, voluntary, nondirective nature of the Committee and its Liaison. The emphasis must be on activity by concerned individuals, not on organization *per se*. Scientists should form the nucleus of each Committee; they have the credibility and expertise to be effective.

I already have the names of a large number of scientists who are interested in becoming involved in such efforts. If other scientists will send their names, affiliations, and addresses to me in care of this journal, I will send them the names of concerned scientists in their states. Organization of a state-wide Committee of Correspondence will then be up to the group. I am proposing to help autonomous groups to organize themselves, not to organize another national society. If each Committee will also send me the name and address of its Liaison, I will put these persons in touch with each other.

There are several existing or projected media through which communication among the states can take place. *Creation/Evolution* will publish short items dealing with pro-evolution activities, creationist activities, tactics that have proven successful, important forthcoming legislative and educational meetings where evolutionists should be represented, and the like. NABT is planning a newsletter which will publish the same kinds of material. Items can also be submitted to *Science Education News*, published by the AAAS Office of Education.

On the basis of the past few years' experience in Iowa and elsewhere, and despite the involvement of creationism in the current presidential campaign, prospects seem reasonable that a pro-evolution program of the kind proposed here can give creationism a substantial and permanent setback.

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THE NEW YORK CREATION BATTLE

by David Kraus

Our group, the Science Council of New York City (SCONYC), is a federation of the nine science teachers' organizations in the City. We had run four successful conventions on educational and pedagogical matters in the past, but were totally unprepared when the creation issue came up in the legislature a few months ago.

Although we knew of creationist efforts to introduce the two-model approach into a revision that was being made of the biology syllabus, we were unaware that a creationist bill had suddenly been considered by the Senate Education Committee. By the time we learned that a vote would soon be taken, we had only one week to defend the integrity of science teaching.

Though still unorganized, we managed to send flyers to all the high schools in New York City asking for a flood of letters and telegrams to descend upon the State Capitol at Albany. The flyers supplied names and addresses of key legislators and of the 17 members of the Education Committee; they also mentioned a few crucial arguments. Quantity, not quality, was urged.

We also alerted The New York Academy of Sciences of the impending

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Mr. Kraus was formerly Chairman of the Science Department at the Far Rockaway High School in New York City and President of the Biology Chairmen's Association. He claims not to be retired—"just re-treaded."

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legislation. That body speedily appointed a committee which prepared a Policy Statement on the Teaching of Creationism that was sent to members of the legislature. A significant statement included was: "The subject known as 'Scientific Creationism' is lacking in scientific substance; we reject it for inclusion in science curricula."

Most members of the Senate Education Committee seemed to see nothing wrong with "letting kids hear both sides of the story." Our hastily organized campaign apprised them of the serious implications of this proposal and of the existence of an articulate, determined, and organized opposition.

We really don't know how significant a part we played in the decision, but the bill was not brought up again in committee. Thus ended our first successful skirmish. We are preparing for next year's battle with a little more savvy.

SCONYC's *Committee for Scientific Freedom* is now in the process of organizing an all-day symposium to be held on Saturday, December 6, 1980 in the auditorium of Rockefeller University. The symposium's purposes are to bring science teachers up to date on new ideas in evolution theory and to make them aware of competing arguments advanced by creationists and evolutionists. We shall also include an open forum from which we hope will emerge concrete ideas for organizing a committee of correspondence for the state. Furthermore, we hope to register volunteers for a communications network that will relay notices to schools and communities.

Statewide publicity for the symposium will go to scientists as well as to high school teachers. We hope that scientists will assume positions of leadership in the effort to educate the public and members of the legislature of the need to keep non-science out of science and to separate religion from government.

Now that the creationist bill has failed, the draft for the new state syllabus in biology has been issued for field trial and evaluation. We have not yet seen the preface to this draft but understand that it will describe the procedure followed by the Bureau of Science Education in deciding to omit creationism.

As in all new campaigns, we still have a number of unanswered questions. For example, what are the implications concerning IRS tax-exempt status if science teacher clubs and committees of correspondence engage in a program of educating legislators and the public on matters that lie within their field of expertise and social responsibility? What are the technical definitions of political activity and lobbying? How can we counteract propaganda aimed at school boards and textbook adoption committees? How can we support teachers in small communities in withstanding local anti-evolutionist pressures? Anyone who can answer such questions and provide guidelines for organization will help grassroot efforts everywhere.

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COMMON CREATIONIST ATTACKS ON GEOLOGY

by Christopher Gregory Weber

In the last issue of this journal, my article "The Fatal Flaws of Flood Geology" attacked the flood geology model of the Institute for Creation Research (ICR) by citing a number of geological formations the creationists can't explain without inventing hundreds of convenient *ad hoc* miracles. However, creationists have attacked orthodox geology by citing geological formations they feel geologists are equally hard pressed to account for with the evolutionary model. This article answers several of their most common arguments, those relating to fossilization, sedimentary facies, and overthrusts. It is written in a question/answer format.

Fossilization

Question: Can geologists actually explain fossilization? Creationists argue that evolution requires sediments to accumulate slowly and tranquilly over millions of years, yet dead animals and plants always rot away or get eaten by scavengers unless they become buried *quickly* after death. This means if the earth's past were as tranquil as evolutionary geologists say, there would be no fossils; all the potential fossils would have rotted away or been eaten long before enough sediments could accumulate to bury them. Creationists therefore argue that only the Flood of Noah could have buried all the fossils fast enough to insure their preservation. How do you answer that?

Answer: Geologists never said that all geological processes were tranquil. Creationists are setting up a straw man and presenting a false dilemma. Their straw man is the imaginary geologist who supposedly says all geological processes are tranquil; their false dilemma is their attempt to force us to choose between this straw man and their Biblical flood, between total tranquility and a monster catastrophe. Actually, the truth lies somewhere in the middle.

Geology operates on the assumption that the *laws* of physics and chemistry have remained unchaged since the formation of the earth. Geology tries as much as possible to explain the geological past in terms of processes that can be seen

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Chris Weber, one of the editors of this journal, is a computer programmer and an amateur geologist. He's followed the creation/evolution controversy for many years.

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happening on the earth today. This basic approach is called "uniformitarianism", the doctrine that "the present is the key to the past". Uniformitarianism does *not* teach, however, that geological processes are tranquil. It does *not* mean that geological processes always occur at the same rates. It does *not* mean that rare catastrophes (like an asteroid colliding with the earth) never happen. What it *does* mean is that processes observable today (either in laboratories or in the field) can explain the vast majority of the rocks we find in the earth.

Question: Can you elaborate on these processes?

Answer: Surely! River floods, volcanic eruptions, turbidity flows, tidal waves, storm waves, and other violent processes observable today are quite capable of burying organisms and preserving traces of them. These processes have been going on steadily for billions of years, as geology text books like Dott and Batten (1976) and Stearn, Carroll, and Clark (1979) show.

River floods bury plants and animals both living and dead in river flood plains and deltas. When Charles Darwin was in Uruguay during the voyage of the Beagle, he learned from one of the local people that several million horses and cattle had died in the drought of 1827-1832; when the drought finally broke, the flooding Parana River buried their bodies in sediments. Even though most of the land surface of the earth is eroding away (and hence not collecting fossils), the river flood plains are accumulating sediments all the time, accumulating fossils in the process.

Out on the continental shelves, most of the sediments are deposited in short spurts separated by long periods of time, as geologist Joseph Barrel pointed out in 1917. Even though river floods are rather rare, they supply most of the sediments to the continental shelves. Storm and tidal waves rework sediments already lying on the continental shelves, burying in the process many sea animals intact (though of course burrowing animals bury themselves, and don't need this sort of help to become fossilized). Turbidity flows are like underwater landslides, only more fluid. In the oceans, these turbidity flows overwhelm and bury creatures suddenly. Across billions of years, these processes have preserved most of the fossils we find today. Only a fraction of a percent of all living things ever become fossils, and of all fossils, only a fraction of a percent have soft body parts preserved. This is just what you would expect if the present is indeed the key to the past.

Question: Are there *any* tranquil processes that form fossils?

Answer: Yes. Swamps and bogs are often highly acid and free of oxygen, and deep ocean basins like the bottoms of the Caribbean Sea and Black Sea are full of hydrogen sulfide and free of oxygen. Here, decay bacteria cannot live, so many animals are preserved and buried, as Dott and Batten (1976) and Stearn, Carroll, and Clark (1979) point out.

In swamps and bogs, bacteria sometimes succeed in rotting some of the plant matter to an extent. However, they soon use up all their oxygen, and kill

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themselves in their own waste products. This explains how entire animals are sometimes preserved from rotting away. P. V. Glob has shown how numerous human bodies have been perfectly preserved for two thousand years in the peat bogs of Denmark. Similarly, delicate insects of Eocene times have been preserved in the bogs that eventually became the lignite coals of Geiseltal, Germany.

In the deoxygenated ocean basins, neither decay germs nor scavengers can live. It is in deposits like these that soft body tissues are preserved as fossils. For instance, the Burgess Shales of the Canadian Rockies in British Columbia are among the very few deposits in the world that give us fossils of soft-bodied animals of Cambrian times. As Morris and Whittington (1979) point out, these animals were living at the base of a reef of calcareous algae, poised between the reef itself on one side, and a deep deoxygenated basin on the other. Every so often, the sediments at the base of the reef would slump into deeper water, burying all these Cambrian animals where no bacteria could reach them. Thus a staggering array of soft-bodied forms were preserved, most of them found only in this deposit.

Question: You seem as though you have no use for catastrophes.

Answer: I wouldn't say that. There's evidence asteroids have collided with the earth in geological history. As Dietz (1961) has shown, remnants of huge craters many miles across have lasted to this day. He even points out that if a large enough asteroid fell into an ocean, it could generate a tidal wave high enough to inundate half a continent. Isaac Asimov, who doesn't take paranormal claims very seriously, has suggested that the story of Noah's Flood (as well as the Babylonian flood story) may have derived from a tidal wave generated when an asteroid fell into the Persian Gulf, washing someone's boat to the foothills of the mountains of Ararat (meaning Armenia). Just this year, Alvarez (1980) reported evidence for a catastrophe that could have wiped out the dinosaurs. Exposed samples of deep-sea sediments show a peculiar dust layer which exactly divides the Mesozoic sediments underneath from the Cenozoic sediments above. This dust layer is very rich in iridium, an element rare on the earth, but plentiful in meteorites. Apparently, then, the dinosaurs may have died off because an asteroid plowed into the earth and kicked up enough dust to blot out most of the sun's light for a number of years. This killed off many food plants in both land and sea. Since dinosaurs, ammonites, and other creatures ate plants and plant-eating animals, they died off along with their food supplies.

So, if there is genuine evidence for a catastrophe, geologists have no trouble accepting it at face value. What bothers them is not catastrophism, but unwarranted supernaturalism. If a perfectly good naturalistic explanation for some phenomenon is available, and if creationists postulate miracles that make God appear deceptive, it is this form of supernaturalism they have no use for.

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Fossil Graveyards and Facies

Question: Creationists say only Noah's Flood can explain huge fossil graveyards like the Agate Springs Bone Bed of Miocene age in Nebraska and the White River badlands of South Dakota. How do you explain these?

Answer: Simple. The Agate Springs and White River graveyards were formed by flooding rivers. The rivers of the Black Hills dumped and buried the White River bones at the base of the hills because there, the torrents slowed down upon hitting the Great Plains. Also, if Noah's Flood were literal history, we would expect fossil graveyards to consist of a mixture of all kinds of animals, but the Agate Springs Bone Bed does not. It contains mostly bones from an extinct small rhinoceros called diceratherium; there are few animals of other species. Evidently a river flood simply overwhelmed a herd of small rhinoceros.

Question: Yes, but creationists note that the Cumberland Bone Cave in the limestone mountains of Western Maryland contains the bones of animals of many different climates mashed together in one pile. How do you answer that one?

Answer: The creationists do not describe the cave very accurately. Once we understand the evidence, we find that the bones accumulated in tranquil circumstances during the Ice Ages. From Franklin Folsom (1956), we learn that this cave has two openings, a horizontal shaft going into the side of the ridge, and a vertical one on the top of the ridge extending down. In the vertical shaft, pioneers hiding from Indians left their rifles, where they were found in this century. By this very same route, the animals one by one brought their bones to be fossilized. During the ice ages, an animal would every so often get killed falling down the vertical shaft, and rot away, leaving disconnected bones. After tumbling down a stepped slope one by one, the bones landed in a pile at the lowest point of the cave. As dripping water dried, it left calcite that cements the bones together. Today we can distinguish distinct layers of bones of cold-weather animals from the glaciations from layers of warm-weather animals from the interglacial periods; the alternation of these layers is hard to explain if the biblical flood story is literal history. As Mohr and Sloan (1955) point out, rats gnawed on these bones, leaving their tooth marks; this fact is rather hard to reconcile with the catastrophist theory that first a tidal wave from the tropics and then a tidal wave from the arctic smashed animal carcases into the mouth of this cave.

Question: Creationists often argue that many fossils look as though they were buried alive and writhing in their death agony. How do you reply?

Answer: Adrian J. Desmond (1977) explains that dead animals often become contorted when they dry out. The dried-up ligaments contract and distort the body. If an animal's body dries out in the hot sun a month before a flooding river buries it in sediments, its fossil would look as if it had been buried while still in pain.

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Question: Creationists like Dr. N. A. Rupke, a geologist of the State University of Groningen in the Netherlands, claim that certain fossil trees (which they call "polystrate fossils") extend vertically through many meters of strata. Rupke says they are found in such coal-producing areas as the Ruhr region of Germany, Lancashire in England, and Joggins in Nova Scotia. How do you reply?

Answer: The creationists again mishandle their sources. The evidence shows that the vertical trees were really buried by flooding rivers.

For instance, *Scientific Creationism* (p. 108) quotes F. M. Broadhurst (1964, p. 866) as saying:

> It is clear that trees in position of growth are far from being rare in Lancashire (Teichmüller, 1956 reaches the same conclusion for similar trees in the Rhein-Westfalen Coal Measures), and presumably in all such cases there must have been a rapid rate of sedimentation.

However, Broadhurst has some evidence that river floods buried these trees, evidence that the creationists do not mention. He continues:

> . . . there must have been a rapid rate of sedimentation. This sedimentation occurred, without doubt, in water that could not have been fast-flowing, since the trees were left in a standing position. It is possible that the land surface with its trees was inundated by flood water (possibly on numerous occasions) from adjacent waterways, the flood water bringing with it large amounts of sediment.

He goes on to say that fossil polystrate trees are found only in the coarse-grained rocks, but not in the fine-grained ones. The reason is that the sediments of the latter probably did not settle fast enough to bury the trees before they rotted away:

> The most likely explanation of the apparent absence of such trees from these sediments is that the latter accumulated too slowly; any trees decayed and collapsed before they could be enclosed by sediments.

Hence the river flood theory can explain why the trees are found upright and why trees were preserved in some rocks but not others; the creationist catastrophe theory cannot.

Also Stearn, Carroll, and Clark mention the polystrate lycopsid trees in the Pennsylvanian coal deposits of Joggins, Nova Scotia. Their point is simply this: Every so often one or more river floods would bury a forest of lycopsid plants up to ten meters deep in sediment. After each flood, a new lycopsid forest would grow out of the newly deposited sediments. Eventually, as the tops of the trees rotted away, the pulpy interior of the trees would also rot away, leaving

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the more resistant outer wood surrounding a pit as deep as ten meters. Primitive reptiles fell into these pits, died of starvation there, and were buried when fresh flood sediments and plant matter filled the pits. Superficially, these trees look as though they support the Noachian flood theory, but ordinary geology explains the evidence much more easily.

Question: Creationists say the permafrost in the river deltas and offshore islands of Siberia is loaded with the bones of thousands of mammoths. Even more of a surprise is the fact that many mammoths have been found frozen intact, such as the Berezovka mammoth. These animals had subtropical plants like buttercups in their stomachs, and their flesh is so perfectly preserved that some adventurer's club once held a banquet on the meat of the Berezovka mammoth. Can you explain the evidence without assuming that some huge catastrophe overwhelmed and froze the mammoths instantly while changing the climate from subtropical to arctic overnight?

Answer: William R. Farrand (1961) has investigated claims like these, and laid many of the exaggerations to rest. In particular, he proves that these animals were arctic animals, and he proves that the Berezovka mammoth was really rather putrified. He gives a chart of the plants found in the stomach of the Berezovka mammoth: they are all arctic plants like conifers, tundra grasses, and sedges. The mammoths had a thick insulating underwool beneath their shaggy coat of hair to shield them from the arctic cold. Ice age cave artists painted pictures of mammoths in their caves, a fact that should settle once and for all that the mammoths were arctic creatures. Besides, Farrand shows that the Berezovka mammoth took several days to freeze. Predators had had a chance to mutilate it before this happened. The excavators found the stench of the partially rotted Berezovka mammoth unbearable; even the earth in which it was buried stank. Histological studies of the flesh showed "deep penetrating chemical alterations as the result of very slow decay." True, the dogs of the excavators may have been scavengers enough to eat the fresher parts of the meat, but the legendary banqueters would have deserved any ptomaine poisoning they got. These facts *alone* do not disprove Flood Geology, but they should answer once and for all the more extravagant claims of some catastrophists.

Question: But how do you explain how all those bones got into the river deltas and how all those mammoths got frozen?

Answer: Actually, the cold Siberian rivers could easily wash carcasses of the mammoths to the river deltas during the spring thaw. I'm sure there were thousands of spring thaws which could cause this. But it should be noted that there is really very little frozen mammoth flesh lying around in Siberia. Farrand points out how only 39 mammoths have been found with some of their flesh preserved; of these, only four have been found more or less intact, including the Berezovka mammoth.

But on top of all this, there is additional evidence that a literal Flood of

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Noah could *not* have deposited these mammoth remains. Farrand points out that we find no other species of frozen animals in Siberia *except* mammoths and wooly rhinoceri. Since these animals were so big and clumsy, they had trouble crossing crevices in the earth's surface, just as modern elephants do. This evidence fits well with the theory that mammoths fell off cliffs and were killed, fell into holes, were buried in landslides, or were caught and buried in ways that more mobile animals like horses and bison were able to avoid. Yet, if the Flood of Noah were literal history, we would expect to find many *different* species of frozen animals, not just the mammoth and wooly rhinoceros. Also, the radiocarbon dates taken from various frozen mammoth remains span the time period from 11,450 to 39,000 years before the present, and I dare say, 27,000 years is a little long for Noah's Flood. I can understand how ordinary geological processes can account for the frozen mammoths, but it is hard to see how such animals could stay afloat for one year in Noah's Flood with their last meal in their stomachs and only partially rotting before landing in their final frozen resting places.

Question: Creationists often criticize geologists for assigning different ages to different parts of the same rock formation while assigning the same age to different rocks in the same region. They maintain that geologists cannot explain huge rock formations (like the Saint Peter Sandstone) that cover much of the country. They claim the fossils give the "illusion" of an evolutionary sequence only because the simple round immobile animals sank faster and deeper than the complex light mobile ones during Noah's Flood. How do you reply to these arguments?

Answer: The creationists who make such arguments don't know the first thing about sedimentary facies. I shall explain them here in detail.

Common sense alone will tell you that when sediments are washed into an ocean or lake, the larger heavier sediment articles will settle out closer to shore, and the finer fluffier current-wafted particles will settle out further from shore. So, if the sand settles out in the river deltas, the clays further out, and perhaps calcareous muck the furthest out of all, then you're going to have different types of sedimentary rock forming all at the same time.

Various processes can make the different zones of sediments shift back and forth and vary in width. If the land subsides, the beds of sediment will move to keep up with the receding shore. If the subsidence stops, then the beds of sediment will move away from the land as the coastal flood plains and river deltas build their way into the sea or lake. As the rainfall varies, and as the mountains erode away or get uplifted, the amount of sediments that get into the sea will vary, and hence so will the width of the bands of sediments. Thus, if you could stick a huge knife vertically into the Earth, slice the surface from the ocean to the land, and examine the cross-section of the sediments, you would see the zones of sand, clay, and carbonates deeply interfinger with each other.

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Therefore after percolating ground waters cement the sands, clays, and carbonates into sandstone, shale, and limestone respectivley, and after uplift and erosion expose them all to view, different zones are formed which the geologist calls "facies". Different parts of the same facies are of vastly different ages, yet different facies on the same level were all deposited at the same time.

Question: Can you give any specific examples?

Answer: I could give you hundreds of examples, but I'll settle for three. Let's start with the early Paleozoic strata of the Grand Canyon.

As John S. Shelton (1966) pointed out, there are three sets of facies in the lower Grand Canyon: the Muav Limestones, the Bright Angel Shales, and the Tapeats Sandstones. As the land surface subsided beneath the ocean, the western ocean moved eastward covering the land. The limestone far out to sea, the shale closer to shore, and the sandstone right by the shore were being deposited all at the same time. Two lines of evidence prove this. Firstly, these facies intertongue deeply with each other, as the diagram shows. Secondly, species that lived for only an instant of geological time left fossil horizons that slice slantwise across the facies. For instance, the horizon of the Olenellus Trilobite slices right across the Tapeats Sandstone; a little higher up, the Glossopleura Trilobite does the same through the Bright Angel Shales. These fossil horizons each represent an instant of geological time. The two lines of evidence show how the three facies formed together simultaneously, and how different parts of the same facies are of different ages.

Volcanic deposits slice cross facies as well as do fossils. In the southern Rocky Mountains, bentonite beds slice across the facies of the Cretaceous system of rocks. Bentonite is a rock that consists of clays that come from weathered and chemically altered volcanic debris. As Stearn, Carroll, and Clark say on page 341:

> Because bentonite beds represent a single event of short duration and can be followed for hundreds of kilometers through the changing facies of the Cretaceous clastic wedge, they are invaluable for establishing correlation.

On page 416, Stearn, Carroll, and Clark show a picture of the sedimentary facies that formed as the Taconic mountains of Ordovician times. As these mountains grew on the east coast of what is now the United States, the river deltas consisting of sediments derived from these mountains built their way further and further westward from these mountains. A shale facies in the east near these mountains interfingers with and gives way to a limestone facies (the Chicamauga limestone) in the west. However, a layer of clay that represents a volcanic deposit slices right across the shale facies into the Chicamauga limestone. As Stearn, Carroll, and Clark say:

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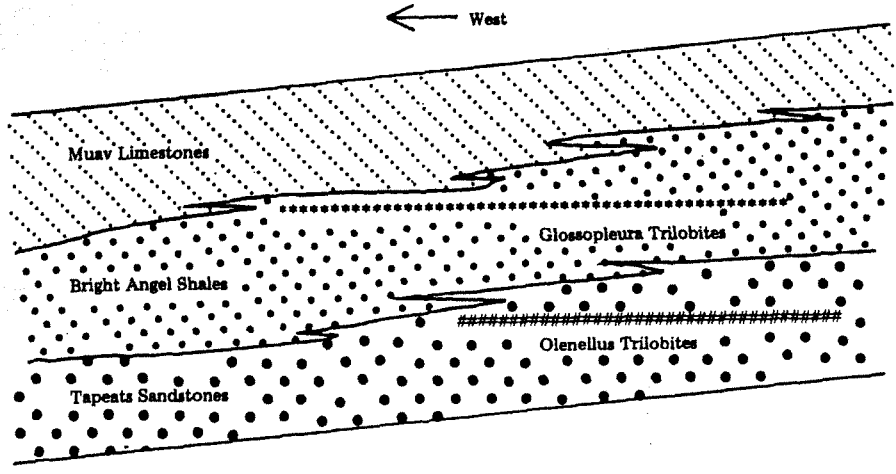

Facies of the Lower Grand Canyon

Thin, highly persistent layers of clay occur within Middle and Upper Ordovician limestones and shales along the miogeocline and adjacent platform. Although these beds are only a few centimeters thick, they can be traced for hundreds of kilometers from the shale into the limestone facies. Because they are independent of facies, they make excellent key beds for establishing correlations.

With this background under our belts, it is easy to recognize the fallacies of the creationist arguments. Those homogeneous sedimentary rock deposits covering thousands of square kilometers are really nothing more than sedimentary facies. If the creationists had read their sources more carefully, they would have found that different parts of the same facies are of vastly different ages; conversely, adjacent facies of different types would often be the same age. Our discussion of facies shows there is hardly any way to *prevent* different facies from forming within the same geological age. Finally, creationists cannot explain why the fossil horizons slice *across* facies the way they do. If their hydraulic selection theory were true, the denser fossils would be found in and parallel to the sandstone facies, and the lighter fossils would be found in and parallel to the limestone facies, not slicing across. This means the fossils are a far better clue to the relative ages of the rocks than the rock type. And it doesn't take quotes

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from technical journals to show this, either. Freshman textooks in geology are all anyone needs to set creationist misconceptions straight.

Question: But even if the grosser creationist claims are wrong, couldn't a monster flood produce facies as well?

Answer: Not at all. A flood strong enough to move all the sediments of the earth would tend to mix the different types up into one big mishmash. If a Flood of Noah were literal history, we would expect to find only a post-Flood veneer of well-sorted sediments on top of the poorly sorted ones left by the flood.

Instead we find huge sediment deposits like those of the Gulf Coast. A layer of sediments up to 10,000 meters thick covers the Great Plains, Gulf Coast, and continental shelf. Here the facies of the river flood plains interfinger deeply with the delta facies of the Gulf Coast, which in turn interfinger deeply with the clays of the continental shelf. These deposits first started to form in Cretaceous times a hundred million years ago, and they have been accumulating constantly and without break through all that time on up to this very moment. These sediments are thousands of times too thick to have accumulated in a mere 5 or 8 thousand year period since Noah's flood. Nor could they have been deposited *during* the Flood, since they are so obviously continuous with and similar to sediments being deposited today.

A similar point can be made on the deep ocean sediments. They are not a mixed-up jumble, and there is no break in their deposition from cretaceous times to today. True, in both cases the rates of deposition have varied; yet, in both cases the sediment types are so similar from top to bottom that the rates of deposition could not possibly have been much faster than the rates of today.

Question: Kofahl (1977) claims that the Mississippi Delta formed in only 5000 years. How do you reconcile his claim with your statements about the Gulf Coast sediments?

Answer: Its *current* delta is 5000 years old, but it has had dozens of other deltas in the distant past. Every so often it jumps its banks, reaches the Gulf of Mexico by a new path, and starts to build a new delta at its new mouth. In fact, the Mississippi River had partly changed its course in 1955, emptying into the Gulf through the Atchafalaya River, until the Army Corps of Engineers stepped in to plug the leak. In the early Cenozoic, the Gulf of Mexico extended as far north as Illinois; the Mississippi had its delta there at that time. These facts, like those on the Gulf Coast and deep sea sediments, can be found in many freshman geology texts.

Question: Is there any more evidence against the hydraulic selection theory besides the sedimentary facies you mentioned?

Answer: Yes, the fossils are in the right order for evolution but not for hydraulic selection. The light animals refuse to stay in the shallow rocks, and the dense animals refuse to stay in the deep rocks where they belong according to

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creationism. Trilobites, light fragile creatures resembling pillbugs, tend to be found only in the deepest rocks. Pterodactyls (flying dinosaurs) are found no higher than the middle rocks, whereas birds are found mostly in the shallowest rocks. Turtles, dense creatures, tend to be found from middle to high rocks, not in the deep ones. Ammonites, light buoyant cephalopod molluscs that resemble the chambered nautilus, tend to be found in the lower and middle rocks, not in the upper ones. There may be many hundreds of obviously distinct species of trilobites of a given size and general shape; the same applies to ammonites. The ICR hydraulic selection theory predicts that many species of the same size, shape, and weight will be found scrambled together in the same rocks, but real rocks show that each distinct species usually has its own horizon absolutely distinct from the horizons of other species of the same size, shape, and weight. Even within the same formation, geologists often find trilobites of the same size and shape segregated by species into horizontal layers. Thus the hydraulic selection theory bristles with contradictions.

Strangely enough, Whitcomb and Morris (1961), staunch champions of the hydraulic selection theory, show nothing but scorn for an orthodox geologist Daniel J. Jones (1958) where he documents some small scale hydraulic selection. Jones' article merely describes in detail processes having nothing to do with evolution that experts observe in progress today moving *microscopic* fossils out of their proper order. He describes wave action, turbidity currents, streams, ground water, wind, glaciers, burrowing animals, and other various processes. He even gives specific examples actually observed in various parts of the world today. He lists evidences having nothing to do with faunal succession or evolution that should put an observer on his guard that the microfossils he is observing have been displaced. For instance, if these microfossils are as large as the sediment they're buried with, then *small scale* hydraulic selection may have sorted them according to size out of their proper sequence. Other telltale signs to look for are fragments of shells, lack of normal series of growth stages, and long fossils pointing in the same direction.

Whitcomb and Morris say that Jones is merely trying to rationalize away fossils that are in the wrong order for evolution by assuming without proof that the damning fossils were *somehow* moved out of order:

> It is not at all uncommon for the smaller fossils on which rock identification is commonly based to be found out of place in the expected sequences. Such anomalies are usually explained as simple "displacements" . . . [At this point, Whitcomb and Morris give a quotation out of context from Jones explaining that microfossils get reworked.] . . . Which, being interpreted, means that when fossils are not found in the stratum to which they have previously been assigned by evolutionary theory, it must be assumed that they have

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somehow been displaced subsequent to their original deposition. (p. 207)

And all that poor Jones did to deserve this gross misrepresentation was simply to supply a dab of evidence for hydraulic selection having nothing whatever to do with evolution!

Overthrusts

Question: According to creationists, there are plenty of places where the fossils are in the wrong order for evolution. This must mean geologists have to assume evolution so as to arrange the geological time scale so as to date the fossils so as to erect an evolutionary sequence so as to prove evolution, thereby reasoning in a vicious circle. When the fossils are in the wrong order, geologists apparently assume the "older" rocks were shoved on top of the younger ones (thrust faulting), or else that the strata were overturned (recumbent folds), even though there is no physical evidence for these processes. In particular, Whitcomb and Morris (1961) maintain the physical evidence proves the Lewis Overthrust and Heart Mountain Overthrust never slid an inch. How do you reply?

Answer: Whitcomb and Morris, again, quote their sources badly out of context. There is plenty of physical evidence having nothing to do with fossils or evolution that show thrust faulting to be very real. Let us consider the Lewis Overthrust and Heart Mountain Overthrust in some detail.

The Lewis Overthrust of Glacier National Park, Montana, consists of the deformed Precambrian limestones of the Belt Formation that were shoved along a horizontal thrust fault on top of much younger (but viciously crumpled) Cretaceous shales. These limestones, by the way, contain stromatolites and mudcracks of the sort seen forming in the Bahamas today. (Stromatolites are a distinct form of calcareous deposits left by algae.) Ross and Rezak (1959) wrote in their article about the Lewis Overthrust that the rocks along the thrust fault are badly crumpled, but Whitcomb and Morris (p. 187) lift the following words from this article:

> Most visitors, especially those who stay on the roads, get the impression that the Belt strata are undisturbed and lie almost as flat today as they did when deposited in the sea which vanished so many million years ago.

But if we read the rest of Ross's and Rezak's paragraph, we find that Whitcomb and Morris quoted it out of context:

> . . . so many million years ago. Actually, they are folded, and in certain places, they are intensely so. From points on and near the trails in the park, it is possible to observe places where the Belt

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> series, as revealed in outcrops on ridges, cliffs, and canyon walls, are folded and crumpled almost as intricately as the soft younger strata in the mountains south of the park and in the Great Plains adjoining the park to the east.

Ross and Rezak repeatedly show how "crushed and crumpled" the rocks in the thrust fault are:

> The intricate crumpling and crushing in the immediate vicinity of the main overthrust, visible in localities like that near Marias Pass, shown in figure 139, must have taken place when the heavy overthrust slab was forced over the soft rocks beneath. . . .
>
> In some places only a single fault surface formed, with crushed and crumpled soft rocks beneath. . . .
>
> Rocks between these faults were crumpled and crushed in a variety of ways. In some places the zone in which fracturing occurred was as much as 2000 feet thick; generally it must have been at least several hundred feet thick.

Question: Whitcomb and Morris (1961, pp. 189-191) note that their friend Walter Lammerts reported finding a layer of shale-like material 1/16 to 1/8 inches thick lining the thrust fault. If any thrust block had slid over that little layer of shale, it would have obliterated it. How do you explain that?

Answer: Actually, the thrust faulting is the only process that could have created this layer. Notice that the underlying shales are crushed, and the overlying limestones are distorted, whereas this little shale layer is quite level. How could the limestones have been deposited distorted-looking on top of a level layer? Obviously, the shale layer consists of powder that was ground up in the thrust-faulting process and later cemented; the sliding created the shale layer.

Question: Whitcomb and Morris claim that geologists cannot find any possible roots for the Heart Mountain Overthrust of Wyoming. How do you prove that overthrusting could have really formed it?

Answer: Simple! The level Cambrian strata broke off along a bedding plane, and slid downhill. By the way, Whitcomb and Morris misquote their source on the Heart Mountain Overthrust as well. On page 183, they reproduce a photograph from an article by Pierce (1957), and insist that Pierce's picture illustrates the place where the thrust block rests on the underlying rock. They quote Pierce out of context as if he were puzzled that the rocks in the picture show no evidence of sliding even though all good evolutionists know that fossils never come in that order.

Actually, this picture has nothing to do with the thrust block at all. Pierce explains that the thrust block slid over younger rocks, that parts of the thrust block eroded away, and that a volcano finally deposited some debris over the

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area where a piece of the block had once stood. This volcanic "early basic breccia" is illustrated in Pierce's photograph; he only states that the volcanic debris, not being a part of the original thrust block, never slid.

Besides, Whitcomb and Morris ignore some deformation of the thrust block that shows it really slid after all. Pierce notes that the thrust block strata are often grossly deformed even when the underlying strata are not. He even shows how the strata from one piece of the thrust block are often sliced across at a slant, forming an angle with the horizontal strata underlying the thrust fault. Whitcomb and Morris could not explain this fact, but it makes sense if overthrusting has really occurred.

Question: But aren't geologists sort of bound to evolution as a matter of principle?

Geologist: If you mean that they are begging the question, then I must certainly disagree. Wherever one small area is undisturbed, its fossils are found in a very definite order from top to bottom. The fossils close to the top resemble modern species far more than the fossils closer to the bottom. When fossils are occasionally found in the "wrong" order, one finds that the rocks are in disturbed areas like mountain ranges, where the sediments are being squished up and out over the surface of the earth like an ice cream bar crushed in a vice. These mountain sediments show plenty of physical evidence of overturning and overthrusting that has nothing to do with fossils. Therefore geologists who avoid overturned rocks when they determine the fossil sequence are not committing circular reasoning.

Question: But aren't geologists doing a lot of guessing when they fill in big fossil gaps in one area with the fossils of another area? After all, the fossil record in any one place is far from complete.

Answer: Suppose a geologist finds that formations ABCD are separated by an erosional gap from GHIJ in one area. Suppose he finds formations CDEFGH in another area. Logic *compels* him to infer that the complete record (if there had been no erosion) would be ABCDEFGHIJ. He is scarcely guessing at all.

Of course, the land areas and the sea areas are constantly shifting, though there is always at least *some* land (and some sea) in any given geological age. The sea areas accumulate sediments washed in from the land, and the erosion of the land will leave a gap in the rocks when the land finally sinks into the sea again. That is how these gaps form. Fortunately, none of these erosional gaps is worldwide, so we can fill the gaps of one area with the sequences of another.

Ironically, the earliest uniformitarian geologists were creationists. Charles Lyell carried his uniformitarianism so far that he believed the species of animals and plants God created in the dim past remain fixed, invariable, and uniform from one geological age to the next. The doctrine that species vary was to him the superstition of catastrophists trying to prove the Flood of Noah (among other catastrophes) because catastrophists had argued that the turnover of

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species throughout the geological ages proved that several times God had wiped out all life on earth with a catastrophe, and then created a new set of living things from scratch. When catastrophists cornered him with evidence that different ages had different fossils, he explained it away by saying that rare species had merely become more common and common species more rare. Only reluctantly at the end of his life after much debate with Darwin and with other geologists did he finally accept evolution.

William Smith, a canal engineer, was the father of modern stratigraphy. He was the first to notice that the higher rocks always had different fossils than the lower ones did. He was always a creationist, and used his discovery only to make money, yet the whole of geology today is based on his discovery. So where is all this circular evolutionary reasoning?

In fact, if anybody is guilty of circular reasoning, it is the ICR creationists. Their Director, Dr. Henry M. Morris (1970) has no reservations about stating what his *real* attitude to geological evidence is:

> But the reason for insisting on the universal Flood as a fact of history . . . is that God's Word plainly teaches it! No geological difficulties, real or imagined, can be allowed to take precedence over the clear statements and necessary inferences of scripture. (pp. 32-33)

Geology is self-correcting, whereas Dr. Morris' beliefs are not. Of course, there is always an infinitessimal chance that he may be right and I wrong in spite of all the evidence I have given. But such a case wouldn't give credit to Dr. Morris. Since his fundamentalist special pleading is not science, his being right could at best be a lucky guess. In the end, it will always be evidence that rules, and today's evidence overwhelmingly favors evolution.

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THE RETURN OF THE NAVEL, THE "OMPHALOS" ARGUMENT IN CONTEMPORARY CREATIONISM

by Robert Price

Surely one of the most bizarre efforts to defend biblical creationism was that of Philip Gosse in his nineteenth century work *Omphalos*. The word is Greek for "navel," and the book addressed itself to the old biblical stumper, "did Adam have a bellybutton?" Why should he, if he were created, *ex nihilo*, as an adult? Gosse contended that Adam indeed had a navel and that he was not alone. For though God created the world in 4000 B. C., a la Genesis, he created it with simulated signs of age and development. This meant that all evidence of evolution, biological or otherwise, could be safely ignored by creationists.

Such an argument is probably unfamiliar to most people, even those who have followed the creation-evolution debate It is now rarely, if ever, used. Instead, fundamentalist debaters tend to concentrate on debunking evolutionary theory with appeals to its allegedly fatal flaws. After all, how seriously could they expect to be taken if they appealed to a logical circle like the "omphalos" argument? Yet, I contend, this old rationalization underlies much of their allegedly "evidential" polemic. I will go on to consider "scientific" creationism in the light of Thomas Kuhn's theory of scientific revolutions. Finally, I hope to show how, seen in the light of Kuhn's work, the creationist "navel" argument actually tends to argue *for* evolution instead of *against* it!

Does the Earth Merely *Appear* Old?

As already noted, Gosse's "omphalos" argument allowed him simultaneously to admit *and* dismiss all the biological and geological data for the great age of the earth and the evolution of life. He reasoned that if God were to create a functioning planet (a "going concern" as Martin Gardner puts it), he must have created it already "rolling." Understood this way, the creation might be compared to a movie, the first frame of which depicts an action scene. No sooner does the film start than a holdup or an air battle is already in progress! Now if

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the earth were born full-grown (like the legendary sage Lao-tzu, fully age 75 from the womb!), there must have been telltale signs of age, but the tale they told was false, at least fictitious. A flowing river (let us say, the Euphrates at the border of Eden—Genesis 2:14) from the first moment of its creation must have already possessed an alluvial deposit along its banks. But, strictly speaking, it was never deposited! So with Adam, who had the mark of an umbilical cord which never existed save in the mind of God. And so with the earth's crust, pregnant with fossils of strange life-forms which never walked the earth. All were created *as if*. Therefore, all those unbelieving biologists and geologists had actually gotten the story *correct*—the problem was they didn't realize it was only a story.

Why did this argument fail to attract any supporters, even among creationists? Simply because all (but Gosse) could see what extreme special pleading this was. Certainly it was all beyond disproof, but so was the Hindu claim that the world was *maya* (indeed a very similar claim!). For that matter, who could prove the world had not been created a mere ten minutes ago, with Gosse recalling his formulation of a theory he had never actually formulated? Alas, solipsism has never been very attractive—not even to modern scientific creationists who know too well that such an argument would get them laughed out of the courts and off the debating platforms.

Modern Creationists and the "Omphalos" Argument

Yet if one carefully examines creationist polemical literature, one is surprised to find this "recessive" argument has newly surfaced, though anonymously. A few brief examples will indicate the unacknowledged debt of "scientific" creationists to Gosse's hypothesis. A most obvious instance occurs in the 1973 work *Science and Creation* by William W. Boardman, Jr., Robert F. Koontz, and Henry M. Morris. In a discussion of astronomy and its implications for the age of the universe, the authors zero in on a trouble spot.

> The Biblical record places the creation of the universe at ten thousand years or less in the past; whereas, the presently accepted distance scale held by astronomers measures the universe in billions of light years. If the light rays now reaching the earth were created in transit at the time of the creation of the stellar objects, they must have been created carrying information descriptive of historical physical events (such as super novae) which never actually occurred, because we would now be observing light rays which were created in transit and never were radiated from the stars which they seem to image. [p. 26].

Omphalos!

Less easy to recognize at first glance is the same book's approach to the

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question of geographical distribution. For instance, doesn't the dominance of marsupials in lonely Australia, together with their filling in of the same ecological niches as their non-marsupial counterparts on other continents (e.g., the existence of marsupial versions of the rat, woodchuck, bear, and dog) count in favor of evolution? In isolation from competition with more efficient placental mammals, the Australian forms seem to have evolved in parallel fashion to their far-off counterparts. Now what does creationism have to say of this phenomenon? Our authors hastily disclaim:

> The general concept of world-wide dispersal of living things including . . . limitation in migration by barriers and by diversification of isolated populations into related varieties or sometimes species is not disputed by creationists. [Nevertheless,] the creationist believes that the basic forms of marsupials were created like the basic stocks of mammals and that they survived in Australia because of lack of competition due to isolation. [p. 91].

To begin with, it is not at all clear the authors are actually denying what they think they are denying! They almost seem to be espousing in the name of "creationism" what really amounts to a "theistic evolutionary" view, that God "created" the various species by evolving them in the manner Darwin suggested. But since this would serve only to "refute" an opposing view by renaming it, we should look for an alternative meaning. In fact, the meaning seems to be that the processes which lead scientists to posit evolutionary speciation really do work as the scientists imagine them to, but *God specially created* the various marsupials despite appearances! Why did God impose such patterns in nature which lead naive scientists to so faulty a conclusion? Well, God just wanted it that way! Omphalos!

We can find the return of the navel implicit in some forms of the creationist attack on comparative anatomy and physiology too:

> On the assumption of creation, it is reasonable that there would be resemblances between creatures and that these resemblances would be stronger between those creatures living in similar environments and with similar physiological functions to fulfill. One could hardly imagine any more probable an arrangement than now prevails, if the origin of all things actually were special creation. [Henry M. Morris, *Evolution and the Modern Christian*, p. 23].

What makes this or any other "arrangement" by a divine creator, "probable"? Couldn't God theoretically have made birds that swim instead of fly, whatever that might mean? Keep in mind that, as a fundamentalist, Morris believes in precisely such zoological marvels, for he envisions the day when "the wolf and the lamb shall feed together, and the lion shall eat straw like the ox"

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(Isaiah 65:25). He must believe that before the time of Noah, carnivores created in Eden did not eat meat (Genesis 1:30). So anything goes, or should, in Morris' frame of reference. Nothing should be more "probable" than anything else since "with God nothing shall be impossible" (Luke 1:37).

This is not mere carping. The point is that by talking in terms of what is "probable" given the earth's environmental conditions, Morris is quietly admitting the evolutionist's criterion of environmental "fitness." In other words, he recognizes the validity of the processes of evolution but merely short-circuits the whole business at the last minute by appealing to the prescientific notion of teleology. In other words, he grants it looks like creatures are fitted to survive in certain environments, and indeed they are. But this is because God arbitrarily wanted it that way! As a result, God framed a riddle which would seem to call for the solution of evolutionary biology (i.e., an explanation of how life-forms are fit for their environments). But instead, the answer is unrelated to the question. The answer is arbitrary fiat. God could have created grass-eating lions; he did in Eden, and will again in the Millenium! But, in between, he put us on a false trail by creating the interlocking web of life that suggested the theory of evolution. Omphalos!

One more example of this argument crops up in the creationist repudiation of human evolution, the "descent of man." Despite appearances, there wasn't any! The creationist, when he doesn't adopt the expedient of simply denying the existence of fossil "cave men," finds himself (and hopes no one else will find him) in an odd position. He cannot deny the rather obvious chain of creatures (let's not prejudice the case by calling them "pre-human ancestors") which start out looking like lemurs and monkeys, and end up looking more and more like humans. But there must be no admission that these are "transitional forms." Instead, they must be declared as extinct but independent life forms which just happen to look like they fall somewhere between monkey and man.

I am aware that there are other approaches taken by creationists, e.g., the "cave-men" were descendants of Noah corrupted by sin, or that all were merely deformed or arthritic individuals who coincidentally were the only survivors of their otherwise normal tribes, etc. But the first mentioned line of reasoning is repeated in the case of Eohippus and its kin . . . oops, one should say those others which *seem to be*, but must not be, its kin! The same with Archaeopteryx. Transitional forms they may *seem*, but the creationist knows better! Why do these fossils have the appearance of chains of development which never actually occurred? Omphalos!

Notice, please, that in none of these cases have the creationists explained the rationale of the omphalos argument as Gosse did. The creationists may not be aware of it themselves! But the implicit logic is the same—the evidence points in the direction of evolution, but that is because (for whatever reason) God simply wanted it that way.

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This is a throwback not only to Gosse's esoteric argument, but also to the prescientific shrugging off of such questions by the catch-all appeal to teleology. Why do birds fly south? Because they were made to do this. As Jacques Monod has observed, the notion of teleology is inimical to scientific inquiry, and has always served to nip it in the bud. How "scientific," then, can "scientific creationism" be? Let us pursue this question along a slightly different avenue for a moment. Then we will be in a position to recognize the final irony of the omphalos argument as it reflects on creationism as "science."

Will Creationists Revolutionize Science?

Creationists often assume the pose of righteous prophets crying in the wilderness, ignored by pharisaical "establishment" scientists. If only their voice of truth were heeded! We would have a scientific revolution! Thomas Kuhn, in his celebrated work *The Structure of Scientific Revolutions* has drawn a compelling picture of the history of science involving a series of turnabouts just such as the fundamentalists anticipate. Now it is far from clear that the creationists are in reality the "scientific revolutionaries" in the scenario. But we will see that their polemical efforts *are* helpfully illuminated by Kuhn's schema, which will be briefly reviewed here.

Kuhn writes to correct the naive notion that the progress of science is simply the accumulation of new discoveries. No, while new empirical discoveries do occur, real movement in science comes when scientists accept a new "paradigm," a conceptual model in the light of which the same old data may be better understood. A scientist will notice certain troublesome data which the current paradigm cannot accommodate. Such data sticks out like a sore thumb, as it were. An example would be the retrograde motion of the planets in the Ptolemaic paradigm for astronomy. Everything else in the heavens moved like clockwork, and was tidily accounted for by Ptolemy, but a fantastic and elaborate series of "epicycles" (celestial wheels-within-wheels) was needed to make retrograde motion predictable. Copernicus was eventually to find this unsatisfactory. Could not some new paradigm be formulated that would deal more naturally, more economically, more inductively, with *all* the data, instead of dealing fairly with part of it and imposing contrivances on the rest? So Copernicus set to work and, going Archimedes one better, he moved the sun. He transferred it from the earth's periphery to the center of our orbit. Now *everything* seemed naturally explainable—no more epicycles. The lesson we are to learn from this brief history is that a scientific revolution occurs when somebody offers a new, more natural, way to construe the data. The new model must make economical sense of as much as possible of the data in its own right; it must make the most possible sense of it without reference to extraneous factors (e.g., invisible epicycles, dictated not by the evidence, but by the Ptolemaic model itself!).

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Though the model is imposed on the data by the theorist, he has derived the model from the suggestion of the evidence itself. It is like one of those puzzles where one must connect all the dots with the fewest possible lines.

On this basis, might the creationists be justified in expecting to usher in a new revolution in biology? How closely do their efforts match the pattern traced out by Kuhn? First we may observe that much (perhaps most) creationist literature concentrates on only half the job—pointing out epicycles. Creationists never tire of indicating troublesome data regarding the theory of evolution, data supposedly far more troublesome that evolutionists believe. Whether their claims are correct or not, creationists could expect no "scientific revolution," according to Kuhn's scenario, until they had supplied an alternative model capable of doing a better job. But insofar as they restrict their efforts to demolition, they are committing one of the most blatant of logical fallacies. They assume that there are but two options, and that one must be true. And, as if we were all playing "Let's Make a Deal," the elimination of evolution automatically vindicates creationism! Not so fast—Lamarck, Lysenko, and a host of other contestants are waiting backstage.

Our second observation is that when creationists occasionally do try positively to defend the elusive "creation model," they violate the necessary criterion of inductiveness. That is, a paradigm must be derived as much as possible from the data themselves, and as little as possible from outside considerations. But Duane T. Gish is forthright in his admission of where his model comes from; "a sound Biblical exegesis requires the acceptance of the catastrophist-recent creation interpretation of earth history. If this interpretation is accepted, the evolution model, of course, becomes inconceivable." [*Evolution: The Fossils Say No!*, p. 64.] Henry M. Morris is equally clear that "the general method of [Bishop] Ussher—that of relying on the Biblical data alone—is the only proper approach to determining the date of creation." [*Evolution and the Modern Christian*, p. 63.]

So the hidden agenda is revealed. After all, "There is nothing hid except to be made manifest" (Mark 4:22). The "scientific" creationists, it would seem, are closer to the Inquisition than to Galileo in whose footsteps they claim to follow. They begin with a biblical dogma imposed heavily *on* the data. It will put the efforts of creationists in proper perspective if we compare them to another famous school of pseudoscience, the offbeat astronomy of Immanuel Velikovsky. In fact the parallel is virtually exact.

Velikovsky reads in Exodus that the Nile turned red ("to blood"), and in American Indian myths that the sky once turned red. First he concludes that Mars once must have nearly collided with the earth; then he shuffles astronomy accordingly. In the same manner Gish and Morris discover in Genesis that the earth is merely thousands of years old with a six-day period of creation; then they practice ventriloquism with the data of geology and biology. In both

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instances, the dusty pages of ancient legend dictates in advance the results of scientific "research."

And thirdly, we must note the methodological outworking of this a priori dogmatism. With their "paradigm" thus derived from an entirely different quarter, it would seem the wildest stroke of luck if the data happened to conform spontaneously to the predetermined pattern. So it must be squeezed into place. With a skill well-developed in dealing with the contradictions found in the Bible, fundamentalists go to work harmonizing the data of science. Let us return momentarily to the deliberations of Morris et al. on the question of starlight. Listing other options besides the unvarnished "omphalos" approach, they point out that:

> There are several possible approaches to the solution of this problem, each of which is worthy of careful study by creationists. Some propose that the distance scale represented by the Hubble constant which relates distance to observed red shift is greatly in error and that the distance scale should be drastically reduced . . . Another proposal made by creationist scientists is based upon the hypothesis made by Moon and Spencer in 1953, namely, that light travels not in Euclidean but in Riemannian curved space with a radius of curvature of five light years, so that no transit time could exceed 15.71 years. And a third proposal . . . is that further study of the meaning of the scriptural terms . . . "[the heavens were] stretched out," etc., may give an understanding of how vast distances correlate with Biblical chronology. It is hoped that creationists may be able to gain a fuller understanding of this problem and attain a satisfactory solution in the near future. [*Science and Creation*, pp. 26-27].

What of the insistent claims that the "creation model" fits the data better than the evolution paradigm? For suddenly the data has become a "problem" requiring a "solution." Notice how various hypotheses are being preferred on the basis, not of their inherent cogency, but rather of how much aid and comfort they provide for the creation model. And this case is symptomatic of the dilemma of creationism in general. The model is prior to the data, and the latter will be coerced and manipulated in any fashion in order to fit the Procrustean bed of the former. Alas, the creation paradigm is almost all epicycle! Obviously, this is the very opposite of what we would expect if the creationist model were the harbinger of a new "scientific revolution."

Now, what is the bearing of the unannounced rehabilitation of Gosse's omphalos argument on all this? Remember that the tendency of the navel argument is always to admit implicitly that the evidence actually does favor evolution, but that it is misleading. Fortuitously, God merely "did it that way."

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In the original version, Gosse's, there were two possible explanations for this. Either God made it all look like evolution in order to test our faith (this was actually suggested by some fundamentalists in order to explain away dinosaur bones). Or, Gosse's own preference, God created the world as if the very real processes now observed in nature (e.g., alluvial deposit) had always been in operation, just so that the curtains could open on a fully set stage. In either case, every time the omphalos argument is invoked, even anonymously, creationists are admitting that they hold to their "new" paradigm *despite* the fact that the old paradigm (evolution) fits the data better!

Creationist arguments evolve as everything else does, reluctant though some are to admit it. And just as in biological evolution we occasionally run across cases of atavism, such a throwback reveals the origins of fundamentalist pseudo-science. No matter how much "scientific" creationists would like to forget that "black sheep of the family," the omphalos argument of Philip Gosse, now and then its characteristics reappear in the population. And when they do, we see what sort of animal we have been dealing with all along—not scientific theory but religious propaganda.

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EVIDENCE SUPPORTING A GREAT AGE FOR THE UNIVERSE

by Stanley Freske

Most, though not all, creationist organizations are committed to the belief that the universe was created no more than 10,000 years ago. In particular, this is true of the most vociferous one, the Institute for Creation Research (ICR), headquartered in San Diego, California. They apparently feel confident that rejection of evolutionary concepts is sufficient to invalidate all astronomical evidence for a great age of the universe. The following four arguments favoring a great age, three of which directly involve astronomy, do not in any way depend on evolutionary theory for their validity. On the other hand, at least the first two give strong support to the theory of stellar evolution.

Supernovae

Stars in a certain mass range eventually experience a cataclysmic event, known as a supernova explosion, in which most of their matter is blown away. Although current models of stellar evolution predict this event, our knowledge that it actually occurs comes, not from speculation, but from direct observation. An ordinary-looking star flares up, remains very bright for a few weeks or months, and then fades away to end up considerably fainter than it was originally. After the event, all that remains is a small dense remnant star surrounded by a cloud of expanding gas.

Probably the best-known example is the Crab Nebula, which is the remains of a supernova explosion observed and recorded by Chinese and others in 1054 A.D. It consists of an expanding gas cloud surrounding a small dense remnant star. The size and outward radial velocity of the gas cloud have been measured; the date for the explosion calculated from these measurements is in close agreement with the Chinese records. We find many remnants of other supernovae with larger and more tenuous clouds and with radial velocities indicating a much greater age than the Crab Nebula. For example, measurements on the Cygnus Loop indicate that this supernova explosion occurred approximately 60,000 years ago. This result disproves the creationist timetable, and leaves only two

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alternatives: Either the expanding gas clouds we see are the results of explosions which occurred as much as 60,000 years ago, or some creator made these clouds appear old, and in fact created remnants of explosions that never occurred. Would this act have been carried out for the purpose of deceiving modern astronomers into the conclusion that the universe is older than 10,000 years? This alternative, i.e., a false appearance of great age, is of course always a possibility, and for easy reference may be called the Gosse Hypothesis.[1]

Star Clusters

Stars are not distributed evenly thoughout our galaxy; instead many, if not most, occur in clusters. These clusters are undoubtedly the result of the original gas clouds being too large for only one or a few stars to be formed. Creationists deny this, of course, and declare instead that God simply created clusters of stars. But this leads to a problem which, to my knowledge, they have not even attempted to resolve. Before we can discuss this problem, however, we need to look at some characteristics of stars.

Distances to stars can be measured without ambiguity, at least when they are close enough to display a measurable parallax. By combining the distance with the apparent luminosity (the observed brightness) we can calculate the absolute luminosity which in turn tells us the rate at which energy, and therefore matter, is being used up by a star. Furthermore, when stars occur in orbiting pairs their masses can be measured. With this data we can calculate the time required for a star to use up all its available matter; i.e., the life-span of the star. Another characteristic of stars which is easily measured is the temperature. This is done by examining its light spectrum; blue stars are the hottest, red stars the coolest.

When a survey is made of the stars for which all these measurements have been made, some interesting facts emerge. When the absolute luminosity of the stars is plotted against temperature (Hertzsprung-Russell diagram), almost all the stars fall along a straight line called the main sequence; the brighter the star the higher its temperature. This is not too surprising, yet it is important because it enables us to distinguish between main sequence stars and other stars, such as red giants and white dwarfs, which fall off the main sequence on the diagram by virtue of their atypical physical size, large or small. More interesting in the context of the present discussion is the finding that the brighter and hotter main-sequence stars also have the greater masses. We conclude that it is in fact the mass of the star, as formed, whether created or evolved, which determines its position on the main sequence.

But now we come to the crucial finding: The hot, bright, blue stars put out so much energy that in spite of their greater initial mass (actually because of it), they will burn themselves out much faster than the cool, faint, red ones. While

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the first kind may have life-spans of a few million years, the second kind may live for tens of billions of years—longer, in fact, than the current estimates for the age of the universe. Let me emphasize that this finding is not based on some "fancy evolutionary theory," but is the result of simple calculations based on straightforward measurements of mass and absolute luminosity. It is also important to understand that being able to determine the life-span of a star does *not* mean that we can look at a star and tell how old it is. We know of course that a blue star must be relatively young since it doesn't live very long. A red main-sequence star, on the other hand, can be practically any age.

We are now ready to consider the clusters. If they were created only about 10,000 years ago we would expect all the main-sequence types to be represented since even the short-lived ones live longer than 10,000 years. Some clusters do in fact have the short-lived stars well represented, indicating that they are less than a few million years old and conceivably only 10,000 years. In the case of most clusters, however, the shorter-lived stars above some point on the main sequence are missing, while the longer-lived ones below are present. The location of this point is different for different clusters. All the clusters have the longest-lived stars represented and never do we find a cluster which has the large blue, short-lived main-sequence stars but not the small red, long-lived ones. Again we are stuck with two alternatives. The first is that the distribution of main-sequence types in a cluster is a function of its age. The second is, of course, again the Gosse Hypothesis; by never leaving out the long-lived stars, but frequently omitting the short-lived ones, our creator has again deceived astronomers into concluding that the universe has existed for several billion years!

Light Travel

An old argument against the creationist notion that the universe is only 10,000 years old is the following. Given such a short time, how is it that the light from stars and galaxies, millions of light-years distant, has been able to reach us? At one time, creationists were less concerned with appearing as bona fide scientists, and their "simple" explanation was that the creator placed the photons in positions already well on their paths from the sources toward the earth, thus giving the universe the appearance of being much older than it actually is. A straight-forward and rather refreshing admission of adherence to the Gosse Hypothesis!

Today, creationists have a seemingly much more sophisticated way of dealing with this problem.[2] The argument is based on a strange article by Moon and Spencer[3] which actually appeared in a professional journal. This article has nothing to do with the creation/evolution issue; instead, as was still common in the 1950's, the authors apparently had an obsessive desire to disprove relativity, including the special theory, and the article was written to this end. (As it happens, creationists do in general strongly disapprove of relativity.)

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A basic tenet of relativity is that the speed of light is a relativistic invariant; i.e., it is independent of any movement of either the source or the observer. The celebrated Michelson-Morley experiment actually does not exclude the possibility of light being dependent on the movement of the source, and the theory that it is had quite a few adherents for a while. However, on the assumption that this theory was correct, it was expected that certain binary stars would show double images, which in fact they do not. As is almost always possible, Moon and Spencer managed to come up with an "explanation" which would get around this difficulty. They proposed that while material objects exist in Euclidian (flat) space, light travels in Riemannian (curved) space! It is somewhat ironic that Riemannian space with a radius of curvature of billions of light-years, in which everything exists and travels, is used in General Relativity. Perhaps the most sidesplitting assumption in the theory of Moon and Spencer is the size of their radius: 5 light-years. Why 5 light-years? Because this is large enough so that the curvature can not be detected by any experiments performed in the solar system, yet small enough to take care of all the binary stars studied! What we have here is nothing more than a mathematical trick specifically designed to make things appear just the way Moon and Spencer wanted them.

One has to entertain the possibility that the article was written and published as a joke. But creationists certainly don't take it as a joke; to them it must seem like a godsend. With light travelling in a Riemannian space having a radius of only 5 light-years, the time it would take to reach us from any source no matter how distant would never exceed 16 years! Again we see the Gosse Hypothesis in all its glory. The creator decreed that light, and only light, should travel in a Riemannian space with a 5-light-year radius, again for the purpose of making the universe appear to be much older than the actual 10,000 years. As an added bonus, it made us poor fools accept the preposterous notion of relativity!

Although somewhat off the subject, a brief note here will vividly illustrate the sorry state of creationist "science." Slusher still believes (in 1980!) that getting around the evidence of the binary stars would constitute a severe blow against Special Relativity, something he relishes. He apparently doesn't know that the unreliability of this evidence has been recognized at least since the early 1960's, although for a completely different reason.[4] He furthermore doesn't know that laboratory experiments utilizing rapidly moving sources have confirmed that the speed of light is independent of the motion of the source,[5] thus making the observations of the binaries totally irrelevant.

Distribution of Nuclides[6]

My final argument is not astronomical but involves physical observations right here on earth, except for one made on the moon. The different atoms constituting the elements and all their isotopes are referred to collectively as the

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nuclides. Some of these are stable, the rest are radioactive with half-lives ranging from a small fraction of a second to tens of billions of years. (The half-life is the time it takes for one half of the atoms of a particular kind to decay.)

There are 47 nuclides with half-lives between 1,000 and 50 million years. If the earth were only 10,000 years old, then there should be detectable amounts of all 47 in nature because 10,000 years is not enough time for them to decay totally. However, only 7 of these are actually found, and that is only because they are continually being generated: 4 of them are members of natural decay series; C-14 is generated by cosmic rays acting on nitrogen nuclei; Np-237 is produced by cosmic rays on the moon; and the 7th, U-236, is generated by slow neutron capture in uranium ore where neutrons are available. Creationists have to explain why the other 40 are missing. What makes this significant is that *all* 17 nuclides with half-lives *longer* than 50 million years *are* found in nature.

Simple calculations show that this division between nuclides which are absent and those that are present is exactly what would be expected if all the nuclides were generated (probably in some star) about 4.5 billion years ago. The longest-lived one among the 40 absentees is Sm-146 with a half-life of 50 million years. If it had existed for 4.5 billion years, only 8×10^{-28} of the original amount would remain today, which would explain why it has not been detected. The same would, of course, be true of those with even shorter half-lives.

Among the 17 that are found in nature, the shortest-lived one is Pu-244 with a half-life of 82 million years. In this case, 3×10^{-17} of the original amount would still exist after 4.5 billion years. This, in combination with the fact that it has been found in a concentration of 9×10^{-20}, would give an initial concentration of 0.003 or 0.3% in this particular ore which is quite reasonable.

For the situation of the earth being only 10,000 years old, we can calculate the probability of the 40 short-lived ones being absent and the 17 long-lived ones being present, as opposed to some random distribution between absence and presence which would then be possible; namely $40!17!/57! = 7 \times 10^{-15}$. (An exclamation mark indicates the factorial.) Actually, if we are assuming that the distribution is accidental, we should really add the approximately 260 stable nuclides to the 17 long-lived ones since they are all found, giving a probability of 6×10^{-52}. In either case, creationists are surely not about to claim that the distribution is accidental. This leaves them, at the risk of seeming repetitious, with only the Gosse Hypothesis!

References

1. After Philip Gosse, its originator. See for example Martin Gardner, *Fads & Fallacies*, p. 124-127. Dover, NY, 1957.
2. Harold S. Slusher, *Age of the Cosmos*, p. 25-37, Institute for Creation Research, San Diego, 1980.
3. Parry Moon, Domina Eberle Spencer, J. Opt. Soc. Am., Vol. 43, p. 635, 1953.

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4. J. G. Fox, Am. J. Phys., Vol. 30, p. 297, 1962.
5. J. G. Fox, Am. J. Phys., Vol. 33, p. 1, 1965.
6. Most of the data used in this section was obtained from Chart of the Nuclides, Knolls Atomic Power Laboratory, Sixth Edition, Dec. 1961.

AN ADDITIONAL NOTE ON THE OMPHALOS ARGUMENT

Dr. Henry Morris, Director of the Institute for Creation Research, has dealt with the appearance-of-age problem many times in his books. The following quotes selected from one of his works illustrate his position on the question.

THE SPECIAL CREATION MODEL MUST INCLUDE AN EVOLUTIONARY APPEARANCE OF AGE

"We are limited exclusively to divine revelation as to the date of creation, the duration of creation, the method of creation, and every other question concerning the creation. And a very important fact to recognize is that true creation *necessarily* involves creation of an 'appearance of age.' It is impossible to imagine a genuine creation of anything without that entity having an appearance of age at the instant of its creation. It would always be possible to imagine some sort of evolutionary history for such an entity, no matter how simple it might be, even though it had just been created."

Henry M. Morris, *The Twilight of Evolution* (Grand Rapids: Baker Book House, 1964) p. 56

. . . BUT THIS DOES NOT INVOLVE DECEPTION

"We insist as emphatically as we know how that the doctrine of creation of apparent age does not in the remotest degree involve a divine deception, but is rather inherent in the very nature of creation. Further, God in grace has even revealed much concerning the true age of the creation in His written Word, but men have simply refused to accept it."

The Twilight of Evolution, pp. 57-58

. . . EXCEPT WHEN THE APPEARANCE OF AGE IS INTERPRETED AS EVIDENCE FOR EVOLUTION

"But behind both groups of evolutionists [those that accept or reject God] one can discern the malignant influence of 'that old serpent, called the Devil, and Satan, which deceiveth the whole world' (Revelation 12:9). As we have seen, it must have been essentially the deception of evolution which prompted Satan himself to rebel against God, and it was essentially the same great lie with which he deceived Eve, and with which he has continued to deceive the whole world."

The Twilight of Evolution, p. 93

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EVIDENCE OF THE QUALITY OF CREATION SCIENCE RESEARCH

by Frank Awbrey

Dr. Gary E. Parker, chairman of Natural Science at Christian Heritage College and one of the most respected members of the Institute for Creation Research (ICR), often appears as the guest on a radio program produced by the Institute. The program, *Science, Scripture, and Salvation*, is broadcast weekly from 77 domestic and 3 international radio stations. In four episodes broadcast last year Dr. Parker claimed that an issue of *Scientific American* devoted to the topic of evolution was "just chockful of evidence for creation." (Transcripts for program Nos. 377 to 380 may be available from ICR, 2617 Madison Ave., San Diego, CA 92116.)

The following quotation from page 1 of transcript No. 380 serves as an interesting example of the quality of that evidence.

> *Radio:* We have with us today Dr. Parker, with the last in a series about evidence of creation from the *Scientific American* issue of September, 1978, an issue supposedly devoted to evolution.
>
> *Parker:* Today I'd like to talk a little bit about the origin of man. That *Scientific American* issue includes a nice article titled "The Evolution of Man" by Sherwood Washburn.
>
> *Radio:* What does Washburn have to say?
>
> *Parker:* Well, on the picture facing the title page there's a fantastic chart supposedly showing a relationship among various mammals worked out by immunological distances. That's a test that compares antibodies from different animals to try to figure how they're related.
>
> *Radio:* What does the chart show?
>
> *Parker:* If you look at the bold, white markings, it is supposed to show that man is very closely related to the chimpanzees and the primates. But if you read the fine print, you find something quite different. 54 animals are listed, 14 of them closer to man than the chimpanzee is: the gorilla is closer, so is the gibbon, the gelada baboon, the vervet, the proboscis monkey, the howler monkey, goeldi's marmoset, and the common tree shrew!
>
> *Radio:* Here we go again—the article is about evolution; the evidence points in another direction!

Dr. Awbrey is a biologist at San Diego State University.

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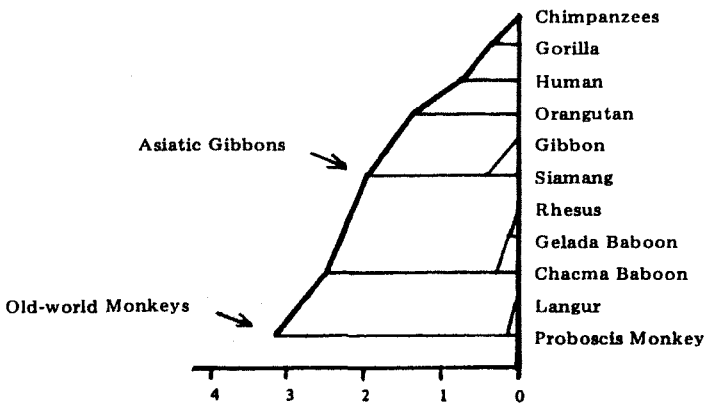
Could that be true? Dr. Goodman had presented the data which the chart is based on in slightly different form during the 1977 meeting of the Society for the Study of Evolution. How did several hundred scientists at that symposium miss the apparently obvious relationship pointed out by Dr. Parker? Are evolutionists so blinded by a pro-evolutionary mind-set that they refuse to see a simple, clear falsification of the theory of descent with modification? These are very important questions because, if the answer is yes, evolutionists are guilty of very poor scholarship. This creationist's interpretation of the meaning of the chart in question demands close examination.

The following illustration, patterned after the *Scientific American* figure helps clarify the issue.



Immunological distance is an arbitrary unit derived from a laboratory technique that measures the cross-reaction between various proteins in different species. Within a species the proteins are identical and so they cross-react completely, so the immunological distance is defined as zero. The evolutionary assumption, based upon descent with modification, is that proteins are less similar in more distantly related species. The more different two proteins are, the larger the measure of immunological distance between them will be.

Referring to our simple illustration, Dr. Parker obviously is reading distances directly from the points where the lines drawn from one species intersects another. Since gorillas, baboons, and gibbons branch off closer to the zero or chimpanzee line (the standard protein) than humans do, he infers that they are more closely related to man than the chimp is.

Dr. Parker could have avoided this erroneous interpretation had he carefully read the caption, the "fine print," accompanying the figure. In the caption it is stated that the immunological distance between humans and Asiatic gibbons is 2 while Parker's own way of reading the figure would give a value of about .3. And had he taken his values from the heavy black line (as is implied by other

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comments about distance in the caption), he would get a value of about 1.4, still far short of the value mentioned. So the chart with its caption is ambiguous and the meaning of the fine branches under the heavy black line (such as within the gibbons) are not explained in either the caption or the article. The only scientifically acceptable way to resolve the dilemma is to examine the original data used to construct the chart. In science, as in all scholastic fields, criticism must be based upon the best available facts.

Much of Goodman's original data were published in *Systematic Zoology*, Vol. 20:19-62 (1971), in an article entitled "Immunodiffusion systematics of the primates. I. The Catarrhini", coauthored by Goodman and G. W. Moore. The data are unambiguously listed in a series of tables. Astonishingly, Dr. Parker must have done the unthinkable and based his entire case on the ambiguous *Scientific American* figure because the data immediately show that Parker's "fine print" reading was erroneous and required that the comments given in the figure caption be ignored. In Goodman and Moore's table 1, based on rabbit anti-*Homo sapiens* albumin serum, the immunological distance data for the species Parker lists as being closer to chimpanzees than humans are: chimpanzees 0.00, gorilla 0.00, gelada baboon 4.67, vervet 4.13, proboscis monkey (not listed), howler monkey 7.31, goeldi's marmoset (not listed but the cotton-top marmoset distance is 6.74) and tree shrew 10.57. Distances based upon a number of other proteins are also listed. The unexplained branches now can be seen to show distance measures within that group only. The supposed dilemma, if it ever really existed, disappears. The results vary slightly, as expected in organisms undergoing selection for such a diversity of niches, but overall agreement with taxonomy based on other criteria is excellent and strongly supports descent with modification. The creationist's predicted mosaic pattern is nowhere in evidence.

Astonishingly then, a leading creation scientist not only misread the graph, he also failed to check the original sources of the data. That would be bad enough in a naive student but it is poor and unacceptable practice for a trained scholar.

Furthermore, on page 2 of the transcript No. 380, Dr. Parker says:

> *Radio:* Again, not much of a pattern.
>
> *Parker:* Not much of an evolutionary pattern—we see more of a mosaic pattern where you find different kinds of chemicals adapted to the needs of that organism, regardless of what it is supposed to be related to. When you try to put together all of the evidence you get some interesting results. On the basis of some blood chemistry tests, our nearest relative is the chimpanzee, but on the basis of milk chemistry it's the jackass; on the basis of blood antigen A it's the butterbean, of all things, on the cholesterol level the gartersnake, on

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> foot structure it's the glacial bear, and on fetal hemoglobin the horse, on tear enzyme it's the chicken.

As pointed out in an earlier analysis, these statements are not consistent with the published data.

To make matters worse other statements (c.f. page 3 of transcript No. 378) demonstrate a gross misunderstanding of the meaning of population heterozygosity and of the basic difference between population heterozygosity and polygenic inheritance of traits such as skin color (p. 2 of transcript No. 378). The discrepancy between Dr. Parker's credentials and the unscholarly superficiality and errors evident in these radio transcripts is difficult to understand. It certainly does not lend any credibility to the creationist claim that the scientific literature is "chock full of evidence for creation."

ANOTHER FAVORITE CREATIONIST ARGUMENT: "THE GENES FOR HOMOLOGOUS STRUCTURES ARE NOT HOMOLOGOUS"

by William Thwaites

I first heard this argument in a public debate with Drs. Gish and Parker of the Institute for Creation Research (7 November 1979). The creationist presentation goes something like this:

> Evolutionists claim that homologous structures, for example the wing of a bird and the forelimb of a reptile, evolved from an ancestral leg. If this is fact, then the genes for reptile legs and bird wings should also be homologous or similar. But the evolutionist finds himself in big trouble with this assumption because the world-famous evolutionist, Sir Gavin de Beer, presents evidence that the genes can change completely without the organ determined by the genes changing at all. In fact de Beer concludes and I quote: "It is now clear that the pride with which it was assumed that the inheritance of homologous structures from a common ancestor explained homology was misplaced. For such inheritance can not be ascribed to identity of genes. The attempt to find homologous genes except in closely related species has been given up as hopeless."

Dr. Thwaites, a geneticist at San Diego State University, has teamed up with his colleague Frank Awbrey to publicly debate representatives of the Institute for Creation Research on two occasions.

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At first glance this seems like a rather exciting observation. If the genes for homologous structures are not themselves homologous, then our understanding of evolution would have to undergo some major revisions. If true, it would mean that the "evolutionary" sequences found in the fossil record cannot be explained by any systematic genetic changes. However, once our excitement wears off, we begin to ask how this most interesting of genetic observations was made. After all I was not aware that anyone had yet been so clever as to identify a gene which is directly responsible for the normal shape of some structure such as a wing. We have, of course, studied many genes in the fruit fly which cause abnormal development of a wing or an eye, but that does not allow us to conclude that these mutations are alterations of the very genes which control the normal structure. These mutant genes affecting structure may act by circuitous routes.

Even when we eventually do identify genes which are directly responsible for controlling normal structures, it will be quite a problem to isolate these genes so that we can determine their molecular structure, the DNA code sequence. I can assure the reader that such developments are at least several years down the road. So how in heaven's name did de Beer reach his startling conclusion? To begin with I found that our library didn't have the de Beer reference Dr. Gish had quoted, so Dr. Gish kindly loaned me his copy. The reference turned out to be one of a collection of "Oxford Biology Readers" written for high school students. Thus, it is neither a research paper nor a scholarly monograph. The particular reader to which Dr. Gish referred is titled "Homology, An Unsolved Problem" (published by Oxford University Press, 1971) and the above quote is found on page 16.

De Beer's conclusion is based on genetic experiments with fruit flies. He notes that a pure-breeding line of flies without eyes has been established by genetic investigators. From time to time this line produces an occasional fly which has eyes. When such a normal-looking fly mates with a standard fly, they can produce eyeless offspring. So the normal-looking parent apparently still had the genes for the missing eyes. Then it holds, de Beer goes on to say, that the normal-looking parent fly enjoyed the use of his eyes because *other* genes took the place of the missing eye genes. De Beer asks why other genes should know how to stand in for the original eye gene. And he concludes that "Homologous structures need not be controlled by identical genes, and homology of phenotypes does not imply similarity of geneotypes." In other words, similar structures do not imply similar genes. This astonishing conclusion, if substantiated, thoroughly undermines modern evolution theory.

A contemporary geneticist, however, has no difficulty in proposing a viable explanation for this experiment. The occasional normal-looking flies probably were produced from the eyeless line through the action of "suppressor" mutations, i.e., additional mutations which restore the normal appearance of a mutant organism. Countless investigations done in the last quarter of a century

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have shown similar cases of mutant gene supression in a wide variety of organisms. Suppressors have been shown to act by means of a variety of mechanisms, but virtually none, if any, acts by replacing the function of the original "missing gene." In fact many studies have shown that the original "missing gene" is usually not missing at all, but is merely altered in some minor way so that it can no longer function normally. The only thing that suppressors have in common is that each is a second mutation which is able to negate the mutant expression of the original mutant gene that it suppresses. Perhaps the original eyeless gene causes the production of an incorrect initiator of eye structure, and the suppressor gene makes abnormal cells which can now respond correctly to the incorrect initiation signal. In a sense this is a case of two wrongs making a right.

Surely de Beer could have thought of this or some other non-paradoxical explanation. Perhaps his purpose in the Oxford Reader Series was to stimulate the thinking of his student readers. He may have assumed that his readers would not yet know about suppressor genes, and that the pedagogical value of presenting an apparent paradox would outweigh whatever worth there might be in an attempt to provide an up-to-the-minute answer for every question. Apparently Dr. Gish has never heard of suppressor genes. So instead of trying to resolve de Beer's paradox in terms of modern research, he preferred to use what may be a teaching tactic as the last word on the subject.

REAGAN FAVORS CREATIONISM IN THE PUBLIC SCHOOLS

Presidential hopeful Ronald Reagan told a cheering throng of over 10,000 "born-again" Christians in Dallas that the lack of "that old-time religion" in public schools has led to an increase in human suffering. He was addressing a rally of New Right preachers and politicians from more than 41 states who gathered on August 22nd to participate in a "Roundtable National Affairs Briefing." In reference to the theory of evolution Reagan declared, "I have a great many questions about it. It is a theory, it is a scientific theory only. And in recent years it has been challenged in the world of science and is not believed in the scientific community to be as infallible as it once was. I think that recent discoveries down through the years have pointed up great flaws in it." He then added that if the theory of evolution is to be taught in public schools, so should the Biblical version of the origin of human life.

(Information from the *Los Angeles Times* and *San Diego Union*, August 23, 1980)

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